

REMARKS

The Office Action dated October 7, 2003 has been received and carefully reviewed. In response, the claims have been amended to positively recite the novel elements of the present invention. Specifically, the present invention has at least three cavities; one cavity concentric with the mass center of the blank, and at least two other cavities located a distance from the mass center of the blank. Support for the amendment can be found at page 2 of the PCT application, line 21, as well as in figures 1 and 2.

The Examiner rejects Claims 14, 15, 17, 18, 20-23, 25, 27, 28 and 31 under 35 U.S.C. §102(b) as being anticipated by Henshaw et al. (U.S. Patent No. 3,623,203). The Examiner states that Henshaw teaches a method of producing a bending-resistant, elongated body comprising: providing an elongated blank 11 having at least one cavity 16 extending essentially along the entire length of the blank 11, the at least one cavity 16 having a longitudinal axis, the at least one cavity 16 being enclosed in the blank 11 but for first and second spaced openings at opposite ends of the longitudinal axis, the inner surface 16 of which cavity is at a distance from the mass center (the mass center is in the vicinity of numeral 15 in fig. 1) of the blank 11 seen in a section at right angles to its longitudinal axis and is arranged concentrically around the mass center, the blank 11 being formed from a metallic material, inserting a fiber composite body 15 formed from a plurality of fibers in a non-metallic binder 13 into at least one of the first and second openings of the at least one cavity 16, and affixing in the cavity 16 the fiber composite body 15 with an outer surface essentially congruent with the inner surface of the cavity 16, wherein a majority of fibers in the fiber composite body both

extend essentially parallel to the longitudinal axis of the elongated blank 11 and are elongated along the whole of its length. The Examiner makes use of figure 1 to demonstrate a cavity that is concentric about the mass center of the blank. In response to this rejection, the claim has been amended to recite at least three cavities, one that is concentric with the mass center of the blank, and at least 2 other cavities, at a distance from the mass center.

An object of the present invention is to achieve a sufficient reduction in weight, while maintaining the bending resistance of the structure. By using the combination of a concentric cavity, coupled with at least two other cavities, it is possible to create a structure that is 40% lighter, while only decreasing the bending resistance by 5-7%. This combination, having both a concentric cavity and two or more other cavities, is not disclosed by Henshaw. As the Examiner notes, Henshaw discloses in figure 1 a concentric cavity for a sleeve. In figure 2, Henshaw discloses multiple cavities located in an I-beam. However, the combination of these two ideas is neither taught nor suggested by Henshaw. Henshaw's invention was motivated by a need to provide "an integrated metal composite structure having a 40 to 60 percent weight saving over equivalent all metal structures"(column 2, lines 14-16). In meeting this stated objective, one large concentric cavity would clearly be preferable over a configuration of a smaller concentric cavity with several other small cavities located a distance from the mass center of the blank. The amount of the heavier metal material removed is clearly greater in the former situation where a single large concentric cavity is present. Using a smaller concentric cavity and adding other additional cavities actually removes less of the heavier metal material. Therefore, Henshaw actually teaches away from the use of the

configuration in the present invention. The Examiner rejects claims 16 and 24 under 35 U.S.C. §103(a) as being unpatentable over Henshaw et al. (U.S. Patent No. 3,623,203). The Examiner considers it merely an obvious matter of design choice to shrink the cavity to the fiber composite body. Since the independent claims 14 and 20 have been modified to recite at least three cavities, one of which is concentric about the mass center, claims 16 and 24 are believed to be allowable by virtue of their dependence on these amended claims.

The Examiner rejects claims 19 and 26 under 35 U.S.C. §103(a) as being unpatentable over Henshaw et al. in view of Tazaki et al. (U.S. Patent No. 4,169,186). The Examiner admits that Henshaw does not disclose a number of longitudinal cavities distributed with an equal pitch symmetrically around the mass center seen in a section at right angles to its longitudinal axis, and cites Tazaki et al. as disclosing this feature. The Examiner relies on figure 1 showing the longitudinal cavities with an equal pitch symmetrically around the mass center. The Examiner then claims that it would have been obvious to one of ordinary skill in the art to combine the teachings of Henshaw and Tazaki. This rejection is respectfully traversed.

Tazaki discloses a "molding material structure of a thermoplastic resin composition comprising (1) at least one pillar-shaped body made of a bundle of glass fibers and a non-oriented thermoplastic resin and (2) an outer covering layer of an oriented thermoplastic resin compatible with the resin in said inner body." This invention is intended to "provide a molding material of glass fiber reinforced thermoplastic resin which will not cause damaging of molding machines through frictional abrasion" (column 1, lines 51-54). There is no suggestion that the techniques used in this patent to produce fiber-reinforced plastics could or should be applied to metallic

structures. The problem that Tazaki's invention solves (i.e. the damaging of molding machines by glass fibers) is not relevant in the fabrication of metallic structures described in Henshaw. In fact, Henshaw's invention is specifically for use "in conjunction with metal carriers" (column 1, lines 15-16). Henshaw specifically states that the elements, "which are all linearly oriented can be made by conventional extrusion, sheet metal roll forming or the assembly of component parts by means of welding, riveting or adhesive" (column 5, lines 14-17). Molding is not a method suggested by Henshaw, therefore there is no motivation or suggestion to look to Tazaki.

MPEP 2143.01 states that "obviousness can only be established...where there is some teaching, suggestion or motivation to do so found either explicitly or implicitly in the references themselves...". It also states "the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In the present invention, it was found that the arrangement of the cavities change the natural frequency of the shaft, an important feature in rotating shafts. There is no suggestion in either of these references that this would result from the combination of these references.

The Examiner rejects claims 29 and 30 under 35 U.S.C. 103(a) as being unpatentable over Henshaw et al. in view of Mahoney et al. (U.S. Patent No. 5,207,848). As independent claims 14 and 20 have been modified, it is believed that claims 29 and 30 are allowable by virtue of their dependence of these revised claims.

Addition dependent apparatus claims 32 and 33 have been added. Support for these claims can be found at page 4 of the PCT application, lines 2-6. In addition to the newly added apparatus claims, there are also new method claims. Support for

these claims can be found at page 3 of the PCT application, line 30 through page 4, line 10.

Reconsideration and allowance are respectfully requested in view of the foregoing.

Respectfully submitted,



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